

Case Report

A mystery: One wound, multiple bullets

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Abstract

This case report provides an unusual presentation of a gunshot wound (GSW) and stresses the importance of gathering complete clinical, scene and historical information, if possible. Sufficient details regarding an injured patient's mechanism of injury (MOI) should be elicited by the treating physician when hemodynamic status of the patient allows. A careful physical exam is essential as are appropriate laboratory investigations and diagnostic imaging. We present a case report of a single GSW found on physical exam with multiple projectiles found on imaging studies. The history of present illness, scene findings and trial transcripts clarify the patient presentation.

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1. Case report

At approximately 08:00 h, a 28 year-old male ran to the emergency department (ED) and presented with a single gunshot wound (GSW) to the right lower chest between the right sternal border and the mid-clavicular line at level of the seventh rib. The skin wound was approximately 1.0 cm by 1.5 cm, oval-shaped, and transversely oriented. The entire wound edge was asymmetrically abraded (slightly more on the left side of the wound). No tissue charring or gunpowder stippling was noted. Vital signs were normal with the exception of tachypnea: blood pressure 140/82, heart rate 66, respiratory rate 26 breaths per minute, temperature 96.9, and oxygen saturation 100% on room air. The patient was diaphoretic and breath sounds were equal and normal. A soft abdomen but severe right upper quadrant tenderness were noted on abdomen palpation.

A chest radiograph in the trauma bay revealed what appeared to be three distinct bullets in the right thoracoabdominal region in addition to a small right hemothorax (Fig. 1). Upon further questioning, the patient denied prior

history of GSWs. A thorough secondary exam revealed no further wounds. An ultrasound FAST exam was negative. CT frontal and lateral scout views of the lower extremities were performed complementing plain radiographs of the chest, abdomen and pelvis to rule out other bullets in this confusing presentation. No other foreign bodies or injuries were found.

The patient proceeded to the operating room (OR) 23 min after initial presentation. After right thoracostomy tube placement, initial chest tube output was 300 cc and final OR output was 590 cc. In the OR, the patient underwent an exploratory laparotomy. A grade II–III right liver lobe laceration¹ was found; there were multiple diaphragmatic lacerations but no active bleeding. While closing the diaphragmatic lacerations, a reflection was noted in the thoracic cavity through one of the wounds. A .32 caliber shell casing was recovered (Fig. 2). The liver was packed. On tertiary exam, no further injuries were noted, and the patient proceeded to an uneventful recovery. The remaining projectiles were left *in situ*.

The patient later conveyed further details of the circumstances resulting in his wounds to hospital staff, and also at trial. The patient had been involved in a disagreement with his brother the evening prior to the shooting. The patient

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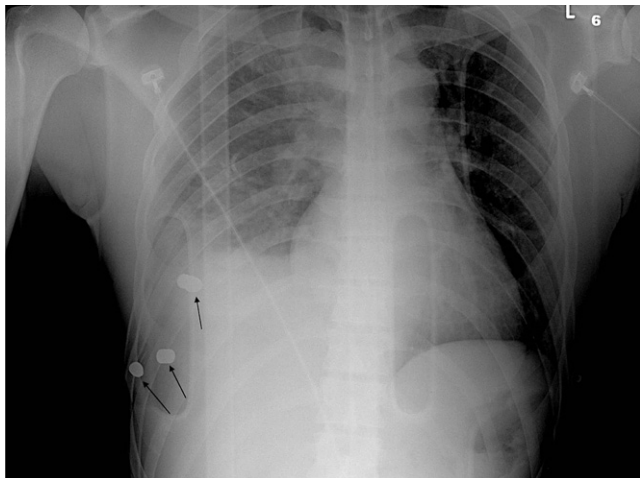


Fig. 1. Chest X-ray depicting three foreign bodies in right thorax.



Fig. 2. Casing recovered from patient.

had gone to work for his overnight shift, and upon returning home, was shot at close range by his brother. During the altercation, the firearm did not discharge on the first attempt. The brother proceeded to manipulate and re-cock the firearm and successfully fired a single shot at the patient. The patient and other witnesses reported hearing only a single gunshot.

2. Discussion

This case provides a rare presentation of multiple bullets fired from a single discharge of a firearm. The key was in finding the bullet casing in the victim. The entire cartridge, or round, consists of a casing, which contains the propellant or gunpowder and the primer, and the bullet, also referred to as the projectile or missile. In this case, a .380 caliber semi-automatic pistol had been loaded with a smaller .32 caliber round. The assailant attempted to fire the weapon, but the firearm did not discharge because the firing pin could not come in contact with the primer of the

.32 caliber round. In adjusting and re-cocking the weapon, the .32 caliber round slid forward into the barrel and the appropriate .380 caliber round moved up the magazine and into the chamber. The pistol then discharged. The .380 caliber bullet struck and fired the .32 caliber round trapped in the barrel, sending three foreign bodies (the .32 caliber bullet, the .32 caliber casing, and the .380 caliber bullet) through the one chest wound. The .380 caliber casing was found at the scene.

This type of bullet injury is referred to as a “tandem” bullet wound. Tandem projectiles occur when one bullet or other foreign body becomes lodged inside the barrel, and receives a “kick” on its base by the nose of the next fired bullet. Transfer of kinetic energy results in movement of the lodged bullet with both objects moving in a forward direction as a single projectile. If the bullets hit the target before separation, a single entry wound is created.²

Few occurrences of tandem projectiles are documented in the literature, with three variations described. First, a foreign object in the barrel prevents appropriate firing of the bullet. Ellis reports a suicidal GSW to the head.³ A barrel-cleaning brush, left in the barrel of .22-caliber rifle, was pushed through the barrel by the bullet. Both the cleaning brush and bullet struck the head of the suicide victim.

The second and most commonly reported tandem projectile event is two bullets leaving the weapon, one pushed by the other. This occurs when the first round fires but does not have enough energy to leave the barrel. Faulty ammunition, from insufficient or contaminated propellant may cause the misfire to occur.^{4,5} The bullets will usually leave the barrel and enter the patient as one unit. Bentley et al., described a man shot and killed while attempting to stop bank robbery suspects. The suspects were reusing spent cartridges, which were then home re-loaded. This led to a less-reliable first round that lacked the energy to propel the bullet out of the barrel of the weapon, a .380 caliber firearm.⁴ On recovery of the bullets from the victim, the tip of the second bullet fit perfectly into the back of the first.

Sinha and Bhattacharya demonstrated this phenomenon of tandem bullets while test-firing 7.65 mm jacketed bullets through a .32 caliber revolver during the investigation of a criminal case.² The base of the first bullet contained unusual indentations in addition to being deformed to fit the nose of the second bullet. They hypothesized that the propellant of the lead bullet did not burn properly. Unburned propellant particles lodged in the seat of the first bullet, which did not have enough energy to leave the barrel. When the second bullet hit the first, the propellant was ignited, causing these unusual markings and demonstrating the tandem bullet phenomenon.

Finally, some tandem projectiles are caused when the entire round, the bullet and casing, in tandem with a second bullet, are fired from a weapon, as described in this case. Mollan and Beavis relate the story of an 18-year-old who was “knee-capped” during the urban guerilla war in Northern Ireland.⁶ Only one pistol shot was heard

and one entrance wound found on exam. X-ray examination showed three foreign bodies in the intercondylar area of the left femur. Surgical exploration of the wound later revealed two bullets and a casing. Interestingly, Mollan and Beavis' case report involved the same caliber bullets as the case presented here.

“False positive” imaging results, such as artifact from other foreign bodies or casing fragments,⁷ as well as “false negative” results (due to bullet embolism), create difficulties in reconstructing the MOI. A bullet can travel in an irregular fashion and cause additional morbidity.⁸ Embolized bullets can cause damage as infarction in damaged organs continues undetected. Infection from embolized bullets or from retained parts would be prevented by earlier detection and removal.⁹ These complications, as well as those caused by retained bullets, may be significant. Complications of retained bullets and bullet fragments have been well documented and include lead poisoning, fistula formation, embolism and migration.^{10–12} While many reports of complications of retained bullets exist, the authors found no literature discussing the initial evaluation of patients with an acute GSW injury and retained foreign bodies from a prior gunshot injury complicating the presentation. This situation remains very plausible.

3. Conclusion

A single GSW with multiple projectiles can be a confusing presentation. If the wounds and bullets discovered on exam do not form a complete MOI consistent with the suspected events surrounding the injury, the “bullets” may be other projectiles or the patient may be harboring a hidden bullet. Simply having an even number of entrance and exit wounds and foreign bodies does not eliminate the possibility of additional retained fragments.^{7,13} Although a missed entry wound, embolized bullet, or retained bullets from previous injuries are more common explanations, one must

also consider the possibility of tandem projectiles from a single shot. All retained foreign bodies must be identified for clinical and legal considerations. A multi-disciplinary approach involving pre-hospital providers, treating physicians and hospital records, as well as law enforcement and legal testimony may be necessary to solve the exact sequence of events in confusing GSW patterns such as the one presented here.

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